



## Turbine Metallurgy and Repair Technology Course

Superalloys, Protective Coatings, Service Damage and Repair

This course will provide a basic understanding of the materials and alloys used in gas turbines, including their strengthening mechanisms, coating protection, life criteria, inspection, welding, and repair processes. Examples and case studies which apply the course information to every day decision making will be drawn from heavy duty industrial turbines, aero-derivative engines, and advanced civil aero engines.

The course is specifically designed to remove the mystique associated with superalloys and provide practical guidance on how to operate, inspect, maintain, and repair turbine components. Specialized material will be presented in a concise, easy-to-understand format and should appeal to both technicians and engineers associated with the operation and maintenance of turbines.

The Liburdi Turbine Services team is well-versed and experienced in all aspects of turbine design, alloy selection, material specifications, coating protection, non-destructive testing procedures, failure investigation, remaining life analysis, repair specifications, and advanced welding, brazing and coating technologies. You are invited to bring practical questions and situations you are dealing with on the job, and course time will be allocated to answer all questions.

The Turbine Metallurgy and Repair Technology Course has been enthusiastically received by turbine operators, OEMs, and support companies in locations such as Calgary, Houston, Charlotte, Atlanta, Toronto, Munich, Anchorage, Jakarta and London.

- Review of Turbine Materials - rotor materials, compressor components, combustion hardware, turbine blades, turbine vanes, turbine discs, steam turbine materials.

- Review of Materials Fundamentals - crystal structures, deformation behaviour, strengthening mechanisms, environmental reactions.

- Superalloy Metallurgy - Nickel-based superalloys, Cobalt-based superalloys, Iron-based superalloys, microstructure, mechanical properties, oxidation / hot corrosion behaviour.

- Protective Coatings - Aluminide coatings, overlay (MCrAlY) coatings, Thermal Barrier Coatings, compressor coatings.

- Component Life Limit / Damage Mechanisms - Creep, high cycle fatigue, low cycle fatigue, thermal-mechanical fatigue, fretting, oxidation, hot corrosion, aqueous corrosion, remaining life assessment.

- Repair and Manufacturing Processes - Metallurgy, welding, brazing, cleaning, coating, machining, forging, casting, HIP and heat treatments, and repair specifications.

- NDT Inspections - Non-destructive testing techniques and specification, surface preparation, sensitivity, surface replicas.

- Repair Specifications - Critical requirements, acceptance standards, inspection requirements - blades, vanes, combustor components.

